Lecture Module - Electrical Signals

ME3023 - Measurements in Mechanical Systems

Mechanical Engineering

Tennessee Technological University

Topic 1 - Introduction

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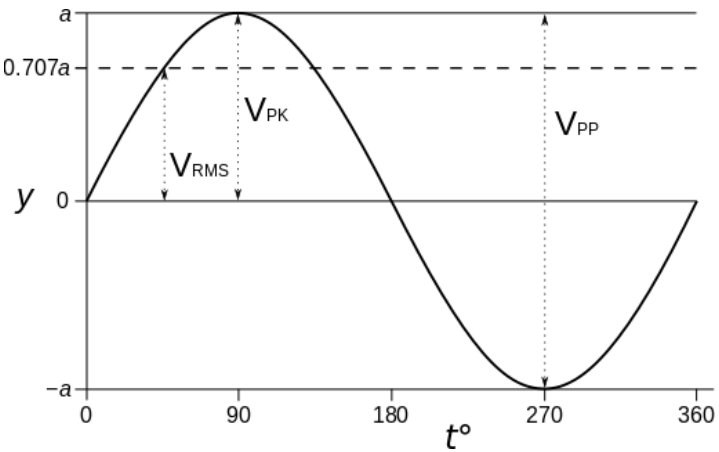
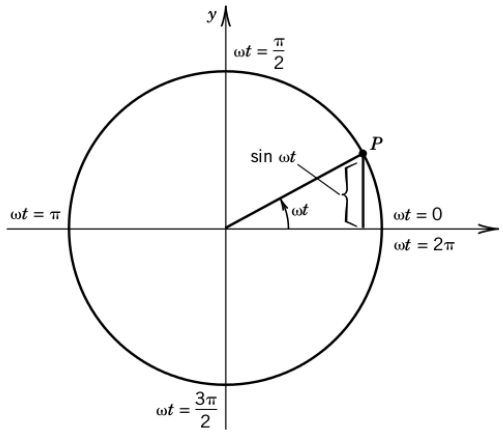
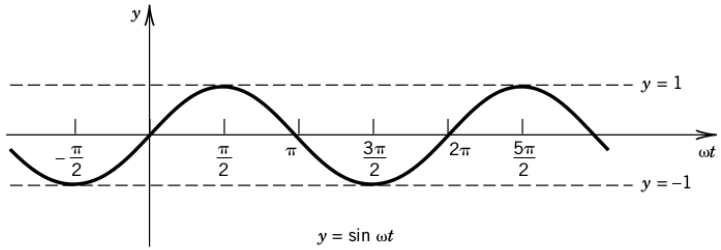
- Signal Amplitude and Frequency - Review
- Genrealized Behavior
- Classification of Waveforms
- Probability Density Function

Signal Amplitude and Frequency - Review

Signal, Amplitude, and Frequency







What is the relationship between the unit circle and frequency?

Genrealized Behavior

Our discussion will assume that the values in the data set are **randomly distributed** about a mean value. It is important to consider what this means.

Classification of Waveforms

- **Analog - magnitude is continuous in time**
- **Discrete Time - magnitude at points in time**
  - sampling at repeated time intervals
- **Digital - exists in discrete points in time**
  - Magnitude is also discrete

Classification of Waveforms

Classification of Waveforms

Classification of Waveforms

Classification of Waveforms

Probability Density Function

âĂİ... a probability density function (PDF), or density of a continuous ran- dom variable, is a function whose value at any given sample (or point) in the sample space (the set of possible values taken by the random variable) can be interpreted as providing a relative likelihood that the value of the random variable would equal that sample ... the PDF is used to specify the probability of the random variable falling within a particular range of values, as opposed to taking on any one value. This probability is given by the integral of this variableâĂŹs PDF over that rangeâĂŤthat is, it is given by the area under the density function but above the horizontal axis and between the lowest and greatest values of the range ...âĂİ - wikipedia

Probability Density Function

- The frequency with which the measured variable assumes a particular value or interval of values is described by its **probability density function**.
- If a **central tendency** exists we should be able to see this in the **probability density function**.
- As binsize of the **histogram** of the data set goes to zero this becomes the **probability density function**.

Probability Density Function

Now, lets's do an example.